

# ARCTIC RESEARCH PROGRAM

Providing science, service, and stewardship for the Arctic and its inhabitants

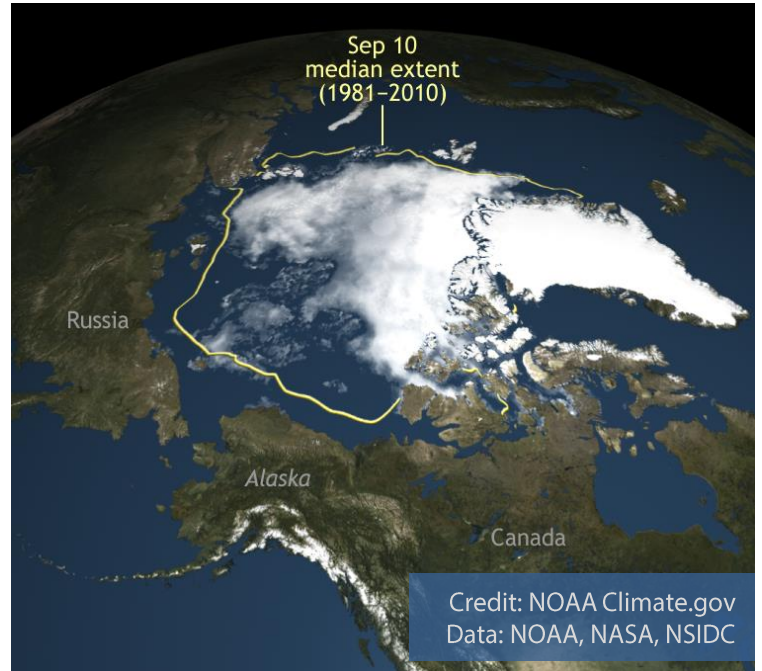
New observations and research show that changes in sea ice extent coupled with ocean and atmospheric warming will impact weather and commerce in regions beyond the Arctic, including in the United States.

Minimum sea ice extent in the Arctic in September 2016 was 33% lower than the 1981-2010 average minimum ice extent. That tied with 2007 for the second lowest value in the satellite record (1979-2016). Also, the average annual surface air temperature anomaly for October 2015–September 2016 was by far highest in the observational record beginning in 1900.

As sea ice retreats, opportunities for Arctic transportation, shipping, and resource exploration will expand. But these rapid changes will also introduce new challenges, such as increased storminess, migration of animals and diseases, and changes in weather patterns that move from the Arctic to the continental United States. These changes pose a risk for food security, cultural survival, and environmental and public health of Americans in the Arctic. For example, Alaskan subsistence and commercial communities such as the Eskimo Walrus Commission rely on sea ice data to maintain their food security programs.



▲ Crabbers use snow machines to cross sea ice and chainsaws to access the water in the winter. Photo Courtesy Alaska Department of Fish and Game.



▲ Arctic sea ice concentration on the date of the 2016 minimum extent, September 10, 2016, compared to the median for 1981-2010. Sea ice is white, frozen seawater covering huge areas on the poles. It reflects most of the solar radiation back into space, greatly moderating global climate.

Developing an Arctic-focused scientific framework that identifies problems, observes the environment, and leads to understanding and more accurate prediction requires a fully integrated Arctic observing network. This is critical to support Arctic operational weather forecast, prediction of floating sea ice direction and speed, and detection of ecosystem structure changes that could affect bird, mammal, and fish species.

The Arctic Research Program, a vital part of NOAA's Climate Program Office, provides support for maintaining and extending observing networks to measure temperature of water and air, thickness of sea ice, species abundance, and biodiversity across the Arctic. This support provides the foundation for better understanding of the complex Arctic system in support of effective stewardship, resilient communities, and thriving economies.

Updated: July 2017

Learn more: [CPO.NOAA.gov/Arctic](https://cpo.noaa.gov/Arctic)

# HOW DO WE STUDY THE ARCTIC?

NOAA's Arctic Research Program (ARP) partners with other NOAA offices, federal agencies, and all Arctic nations to sustain observations.

## INTEGRATED OBSERVATIONS



Sustained and integrated observations are critical to understanding how rapid Arctic changes will evolve and impact people and ecosystems worldwide. To this end, the ARP-led **U.S. Arctic Observing Network (U.S. AON)** works with various federal agencies to sustain well-defined networks of observations. U.S. AON will provide high quality science to support stakeholder needs and agency operations.

Arctic researchers study clouds, sunlight, and greenhouse gases in the air. They also monitor temperature, wind, precipitation, and pressure in the Arctic. Collecting a wide range of atmospheric data allows scientists to better understand the atmosphere's composition in the Arctic and how it can influence the environment. Data is collected, maintained, and shared worldwide through the ARP-supported **International Arctic Systems for Observing the Atmosphere (IASOA)**.

## ATMOSPHERIC RESEARCH



## INTERNATIONAL BUOYS



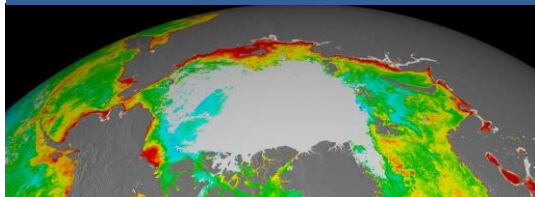
Supported by ARP in the United States, **The International Arctic Buoy Programme (IABP)** is an effort by multiple international agencies to deploy and maintain buoys in the Arctic Ocean to collect oceanic and meteorological data. These data are crucial for forecasting sea-ice conditions, which influence shipping traffic and the commercial industry in Alaska and the rest of the United States

**The Saildrone** is a wind-powered, unmanned surface water vehicle able to reach remote and harsh environments in the Arctic and collect atmospheric and oceanic data. Developed by Saildrone, Inc, of Alameda, California, Saildrones are supported by ARP in conjunction with NOAA's Pacific Marine Environmental Laboratory. These vehicles will complement the limited manned research cruises in the Arctic to enhance the nation's environmental intelligence in this rapidly changing environment.

## ARCTIC SAILDRONE



## ECOSYSTEM DATA



**The Distributed Biological Observatory (DBO)** is a data collection program to study changes in Arctic ecosystems. Supported by ARP, U.S. researchers collaborate with other international agencies to collect physical, chemical, and biological data aboard vessels in the Pacific Arctic. Future DBO research projects will expand observations throughout the Arctic Ocean.

Updated: July 2017

Learn more: [CPO.NOAA.gov/Arctic](https://CPO.NOAA.gov/Arctic)